Working Paper Series

506

CONTAINING THE FERTILIZER SUBSIDY IN INDIA: AN ANALYSIS OF SUBSIDY CONTAINING STRATEGIES AND ITS OUTCOME

AJIL MANKUNNUMMAL

Centre for
Development Studies
Thiruvananthapuram - 695011
Kerala, India

Working Paper

506

CONTAINING THE FERTILIZER SUBSIDY IN INDIA: AN ANALYSIS OF SUBSIDY CONTAINING STRATEGIES AND ITS OUTCOME

Ajil Mankunnummal

April 2022

CENTRE FOR DEVELOPMENT STUDIES
(Under the aegis of Govt. of Kerala & Indian Council of Social Science Research)
Thiruvananthapuram, Kerala, India

Abstract

By providing a conducive policy environment in the early days, the Government tried to build a base for the fertilizer industry by encouraging fertilizer products' consumption and distribution. But all these caused a high cost on Government as the subsidy out goes to the sector was mounting. There was a shift in the focus of the Government after the reforms. With the economic reforms, containing the fertilizer subsidy burden and foreign exchange burden on the import of fertilizers has become a serious concern of the State. By introducing policies for changing the farmgate prices, reducing the cost of production and efficient distribution of subsidies, the State tried to contain the subsidies in the post-reform era.

Using the data from Fertiliser Statistics (FAI), Government Budgets and Department of Fertilizers, Government of India, the present paper is an enquiry into the Government strategies to contain the fertilizer subsidy and its impact on it. Analysing this question with the Economic Liberalisation framework, it is revealed that the subsidy containing measures had a positive effect on it as the fertilizer subsidy either remained more or less constant or declined after 2010 in terms of both absolute amounts and share to total GDP & Agriculture GDP, even though the total fertilizer subsidy touched a record high of Rs. 140122.32crores in 2021-22.

Keywords*:* Fertilizer Manufacturing Industry, State Policies, Fertilizer Subsidy

JEL Codes:H2, H5, H6, L510, L650, Q1

1. Introduction

Fertilizers are very crucial to many developing economies. Governments in most developing nations have intervened in the fertilizer market to achieve different national objectives. An essential intervention in this regard is the fixing of fertilizer prices. To promote fertilizer use, to avoid the rise in crop prices, and subsidize agriculture, it is crucial to supply fertilizers to the farmers at a reasonable level. The relevance of fertilizer subsidy comes at this stage. The farmgate prices are fixed much below the average cost of the production of fertilizers. The Government must provide the difference between these two as Subsidies to the fertilizer manufacturers; otherwise, it would result in the exit of the producers from the market. In short, the Government fixes the fertilizer prices at two levels, producer/manufacturer and consumer/farmer, to make fertilizers available to the farmers at a stable and affordable rate and give the manufacturers a reasonable return on their investment to encourage domestic production. Such pricing programmes have resulted in high levels of fertilizer subsidy. The ever-increasing government budget burden in many developing countries has become a significant concern (World Bank, 1986).

Being a major consumer and producer of fertilizer products globally, India had started promoting fertilizers during the Green Revolution in the 1960s. The nature of the fertilizer manufacturing industry in India has created severe problems for policy-makers over the years. The State's active intervention in the sector promoted the use and production of fertilizers in the country. The Fertilizer subsidy, as a part of the intervention in the pricing, has increased from a mere Rs. 60 crores in 1976-77 to Rs. 140122.32 crores, the highest ever, in 2021-22.

Reducing fiscal deficit has been a big challenge to all governments. It can be possible by compressing the government spending on subsidies. With the economic reforms, containing the fertilizer subsidy and foreign exchange burden on the import of fertilizers has become a serious concern of the State (Bansal et al., 2020). There have always been criticisms against the fertilizer sector for straining the country's fiscal deficit with rising subsidy bills. The current subsidy payment regime compensates the manufacturer for the difference between the Government's regulated fixed MRP and the manufacturer's production cost. However, production costs can vary dramatically between manufacturers, depending on the types of products produced, vintage of the plant and machinery, upgradation of technology, improving

people's competency etc. Given the heterogeneous nature of the Indian Fertilizer industry and the low economic status of the farmers, the State has been facing the burden of fertilizer subsidy to go hand in hand with both the producers and consumers of fertilizers, without which the objective of food security would fail.

This paper analyses the State's fertilizer subsidy containing strategies and its outcome over the years.

2. Motivation for the Study

The fertilizer sector has been a recipient of a significant chunk of the subsidy in India over the years. The industry has been highly criticized for draining the country's fiscal health too. The post-liberalization period witnessed a shift in the sector's policies as the previous policies created a heterogeneous industry with inefficient producers. It gave more importance to making the industry efficient and containing the fiscal burden. Besides this, the introduction of the FRBM (The Fiscal Responsibility and Budget Management)Act in 2003 made the Government to undertake measures to reduce the fiscal deficit.

Given a shift in policies in the sector and the introduction of the FRBM Act, it will be interesting to analyse the outcome of the fertilizer subsidy containing strategies adopted by the Government.

3. Survey of Literature

There have always been debates on pricing, cost of production and subsidy in the fertilizer sector. Given the importance of fertilizer in India, the government has decided to go hand in hand with both the producers and the consumers of fertilizers. For this, they provided subsidies, which were very costly.

Fertilizer prices in most developing countries are determined directly by the Government at both producer and farmer levels (World Bank, 1986). India does not feel that the price of fertilizers should be determined by the 'equilibrium' resulting from the interaction of fertilizer supply and demand, but should be derived from the optimal level of the final demand and supply for food. With this price system, the Government fixes the prices for fertilizers at two levels: producers and consumers. The two-level pricing makes fertilizers available to farmers at stable and reasonable prices to encourage increased agricultural production and give fertilizer producers a fair return on their investment to encourage efficiency and growth in the industry (World Bank, 1986).

The normative cost-plus system in India was introduced as Retention Pricing Scheme (RPS) in 1976. The plant-level cost-plus pricing in the industry resulted in subsidies in the sector. The subsidy was paid to the manufacturer as an amount equal to the difference between the price paid by the farmers and the retention price of the manufacturers. The RPS achieved its objectives like developing a large domestic industry and near self-sufficiency in fertilizer production and increased consumption of chemical fertilizers, but it fostered inefficiency and led to a huge burden of subsidies (Gulati, 1990; Mittal, 1994; Sharma et al., 2009). RPS had encouraged indigenous production by raising capacity utilization and boosting investments in the industry. Hence, it made it possible for the Government to provide fertilizers to the farmers at affordable prices (Gulati, 1989, Kumar, 1999a).

Desai (1986) showed his concerns about increasing fertilizer subsidy under the retention pricing scheme and stated that raising the retail prices or lowering the prices paid to the fertilizer manufacturers could reduce the subsidy. He argued that raising the retail prices will adversely affect the fertilizer consumption, on which the targets for agricultural production depend. Given the upward pressure on the cost of fertilizer production and the industry's claims that even current prices are not enough to ensure a fair return on investment, there is virtually no apparent scope for lowering the retention prices.On the other hand, Mittal (1994) argued that fertilizer prices in India tend to be sticky as they have acquired political overtones because low prices of agriculture inputs are regarded as an essential instrument of keeping a large chunk of rural voters satisfied.

Later, the Government of India undertook a new initiative in August 1992 to move away from the highly regulated system by decontrolling the phosphatic and potassic fertilizers. Partial decontrol[1] of the fertilizer sector led to a sharp increase in the prices of P and K fertilizers. Since nitrogenous fertilizers became cheaper, a sharp fall in P and K fertilizers' consumption further skewed the less favourable NPK balance[2] prevailing before the decontrol. This lopsided pricing harmed fertilizer use efficiency (Meenakshi, 1992). Prices of DAP used to be lower than that of Urea before the decontrol of P&K fertilizers in 1992. After that, the prices of DAP and MOP increased more than the prices of Urea. Prices of Urea remain almost constant because of the fertilizer subsidy, and that of MOP and DAP have undergone significant changes over the years (Gulati et al., 2015, 2018). The Hanumantha

[1] By 1994, all fertilizer products except the urea were decontrolled.
[2] Favourable NPK ratio is 4:2:1.

Rao Committee (1998) recommended discontinuing the unit-wise RPS and adopting a uniform price for the urea and DAP units based on feedstock.

The high production cost was always a problem for the Indian fertilizer industry, especially the urea industry (Sharma et al., 2009). Age of the plant, choice of feedstock, high cost of feedstocks, shortage of raw materials, high cost of inputs for the production, failures of the production equipment, change in government policies over the years and change in demand for the fertilizers have led to lower production capacity utilization in Indian fertilizer industry (Venkateshwarlu et al., 2002; GoI, 2015). Leela (1984) also stated that major factors contributing to the high cost of domestic production of fertilizers in India are the choice of technology, size of plants, the extent of capacity utilization, delays in implementation of projects, and choice of product mix. Later, Roy (2001) pointed out that the higher cost of production in the fertilizer industry is not because the plants are less efficient or the labourers work less, but because of costlier inputs like the feedstock of petroleum. To reduce the cost of production, he advocated using coal as the feedstock, which is abundantly available in India. The Hanumantha Rao Committee (1998), given the shortage of raw materials and high production cost, also suggested setting up joint ventures abroad where the feed stocks are abundantly available.

On the other hand, World Bank (1986), by looking at the subsidy, had argued that it is dangerous since the cost of production can be covered under the subsidy; there is very less initiative from firms to reduce the cost of production. Later, the Hanumantha Rao Committee (1998) criticized the RPS system by saying that there was no incentive for innovation or incentive to encourage energy efficiency. The cost-plus content of the RPS affected the Government's decision-making process for fixing prices. It did not envisage any exit policy for the inefficient units. The emphasis was on production instead of on the cost of production. Unrestricted entry of high-cost producers and the inability of old or sick units to generate surpluses to modernize themselves led to a heterogeneous industry (Kumar,1999).

Meanwhile, over the years, the Government of India has also adopted several policies to reduce the cost of production and hence the subsidy. The Expenditure reforms committee report (2000) suggested that the Urea producing plants switch over to LNG, a cheaper feedstock than others, before 2006. The Expert Committee on Complex fertilizers and DAP in 2001 and 2003, respectively, asked the firms to reduce costs and gave them concessions

based on their feedstock. New Pricing Scheme for the Urea units in 2003 induced the Urea producing firms to adopt cost-reduction measures on their own and be competitive. The policies to reduce the consumption of energy and hence the cost of production were initiated in New Urea Policy (2015), covering the period 2015-16 to 2020.

In 2010, to ensure the balanced application of fertilizers, the Government moved towards Nutrient Based Subsidy (NBS)[3] instead of the existing product pricing regime. It was only for P&K, SSP, and NPK fertilizers. The Government also adopted Direct Benefit Transfer (DBT)[4] in Fertilizer subsidies from 2016 onwards in a phased manner (FAI, 2018).

Price control and other government regulations encouraged Urea overuse. Also, they led to the smuggling of fertilizers to neighbouring countries like Bangladesh and Bhutan, where one can sell the fertilizers at a higher price than in India (Economic Survey, 2015-16). Gulati et al.(2015, 2018) also criticized the subsidy policy adopted in the fertilizer sector over the years by stating that it created a substantial financial burden to the Central Government and keeping the urea prices low; it also failed to encourage a balanced use of fertilizers in the soil.

4. Research Question

The review of literature on the fertilizer sector revealed that the provision of fertilizer products to the farmers at affordable prices and decent returns to the manufacturers had been the primary objectives of the State at the start of the planning period to achieve food security. Given the importance of the Fertilizer industry with its close linkage to the agriculture sector, the State has to intervene in the sector with the pricing policy by introducing Subsidies. The increasing Subsidy burden prior to the liberalization era led to a significant shift in the policy focus after the liberalization. The State started to contain fertilizer subsidies in the post-reform period by introducing different measures. The main research questions this paper asksare;what are the measures adopted by the State to contain the fertilizer subsidies, and did the State become successful in doing so.

[3]Nutrient Based Subsidy (NBS) programme for fertilizer was initiated in the year 2010. Under the scheme, a fixed amount of subsidy decided on an annual basis is provided on each grade of subsidized Phosphatic and Potassic (P&K) fertilizers, except for Urea, based on the nutrient content present in them.

[4]The Government has introduced Direct Benefit Transfer (DBT) system for fertilizer subsidy payments. Under the fertilizer DBT system, 100% subsidy on various fertilizer grades shall be released to the fertilizer companies, on the basis of actual sales made by the retailers to the beneficiaries.

5. Data Sources and Organisation of the Paper

This paper uses the data from Fertiliser Statistics of the Fertilizer Association of India from 1950 to 2020. Besides that, it also uses data from the Department of Fertilizers, Government of India and Budgets of Government of India.

The paper is organised as follows; after the introduction and motivation for the study, the paper gives a brief review of the literature. Later it puts the research question and then the data sources. After building a framework for the analysis, the paper then looks into the impact of the subsidy containing strategies in pre and post-liberalization eras separately and then concludes.

6. Framework for Analysis

Government policies play an essential role in the growth of an economy. As far as the Fertilizer manufacturing industry is concerned, the industry, with different government policies and interventions, became a heterogeneous industry producing different products with different feedstocks, technology, and cost of production over the years. Since fertilizer products are essential inputs for agriculture and almost 60 per cent of the population in India is still depending upon agriculture, the government formulated policies separately for the different products over the years, and this has resulted in a huge financial burden to the government and also made a considerable impact in various aspects of fertilizer production, consumption and distribution.

The review of literature and policies concluded that the pre-liberalization period in the fertilizer sector was the era of conducive policies. The government's prime objective was to develop an indigenous industry by encouraging maximum investments in the industry and promoting consumption for achieving food security by providing fertilizer products at affordable rates to farmers. The introduction of the Green Revolution and the Retention Price Scheme had encouraged these objectives. The roles of entrepreneurs were limited as the sector was entirely under the control of the government. But the mounting subsidy payments resulting from these two objectives caused the government to shift the approach toward implementing policies to contain subsidies in the sector in the aftermath of Economic reforms in the 1990s.

Post-Liberalization era focused on containing the mounting subsidies on fertilizers. The subsidy containing strategies were adopted in three ways. The first one is decontrolling the industry, i.e., giving the entrepreneurs more roles like setting the prices in a free-market situation and importing the fertilizers. The second one is making the urea sector, the controlled sector, more efficient and competitive. Encouraging more investment and hence the production are a part of this. The last one is the efficient distribution of subsidies by containing leakages.

Policies in Fertilizer Sector	
Pre-Liberaliation	Post-Liberalisation
Policies for Promoting Production and Consumption of Fertilizers-	Policies for Containing the fertilizer subsidy
1. Retention Pricing Scheme 1976-77 – Prices are determined at two levels; both at consumer and producer 2. Subsidy, the difference between these two prices, was given to the manufacturer 3. Priority is given to the production rather than the cost of production 4. High cost of production and low farm gate prices	1. Partial Decontrol of the Industry in 1992 and the introduction of a Concession scheme for the non-urea sector 2. Discontinuation of RPS and introduction of New Pricing Scheme in Urea sector in 2003 3. Policies to improve the competition, to be efficient, to reduce the cost of production 4. Nutrient Based Subsidy in 2010 5. Investment policies- 2008, 2012 6. Policies for efficient distribution of Subsidy
Mounting subsidy Burden	Containing the subsidy burden

7. The Era of Conducive Policies

The Committee on Fertilizers (Sivaraman Committee)1965 recognized the need to promote fertilizers as an essential precondition for successfully introducing new agriculture technology in India. Adoptingthe green revolution to achieve self-sufficiency in food grain production in the mid-1960s through an integrated effort, led to the importance of fertilizers

in India. To achieve this, the State had to actively promote fertilizers among the farmers, creating awareness by educating the farmers on the economics of using fertilizers, etc.

The oil crisis and low realization of expected consumption in the early 1970s[5] led to a high increase in prices of imported fertilizers, resulting in a decrease in the consumption of fertilizers in 1973. After that, the government realized the need to reduce fertilizer prices to stimulate consumption. Implementing the Retention Price Scheme after the recommendation of the Marathe Committee as a part of the Intensive Fertilizer Promotion Campaignwas a significant step toward ensuring the fertilizer products at an affordable price to the farmers.

Pricing of fertilizers was essential in boosting consumption and thereby ensuring food security. Hence, the government decided to set the prices at a reasonable level. But on the other hand, fixing the prices at a low level would adversely affect the manufacturers' returns. To address these two issues, the government adopted the retention price scheme in 1977. As we have seen earlier, the government fixes the prices at two levels: consumer and producer levels. The difference between the farmgate prices (the farmers are paying) and the retention prices (the producers' ex-factory prices) was the manufacturers' subsidy. The main issue in this scheme was the units with a high cost of production used to get more subsidies. So the units were never involved in mechanisms to reduce production costs and improve production efficiency. More emphasis was given to production, not on the cost of production. The scheme never envisaged an exit policy for the inefficient units. The increased investment in the industry due to the conducive policy environment helped reach a high level of fertilizers production. Along with this, no hike in farmgate prices fixed at the affordable level resulted in mounting fertilizer subsidy by the end of the 1980s. In short, manufacturers and consumers have achieved benefits under this scheme at the cost of the government (Gulati, 1990; Mittal, 1994; Sharma et al., 2009).

7.1 Mounting Fertilizer Subsidy in Pre-Liberalization Era

The high consumption, especially after the RPS, reflects its impact on fertilizer subsidy as the total fertilizer subsidy increased over the years. Table 1.1 shows the mounting subsidy in the fertilizer sector. The subsidy had increased from 526 crores in 1979-80 to 5185 crores in

[5]"Fertiliser consumption has not increased as planned. The targets are not likely to be reached. The likely consumption of nitrogenous fertilisers in 1973-74 is now reckoned at 2.60 million tonnes (N) as against the original target of 3.20 million tonnes (N). Against the Plan target of 1.4 million tonnes (P:P5) for phosphatic fertilisers, actual achievements are likely to be around 0.8 million tonnes (P2 0G)·"

1992-93. The share of fertilizer subsidy in total subsidy has also increased from 34.09 per cent to 42.32 percent during the same period. The joint parliamentary Committee on Fertilizer pricing constituted by the government of India in 1991 concluded that the rise in subsidy was essentially due to an increase in input prices that was never reflected in the farmgate prices, increase in the cost of imported fertilizers and devaluation of rupee in 1991.

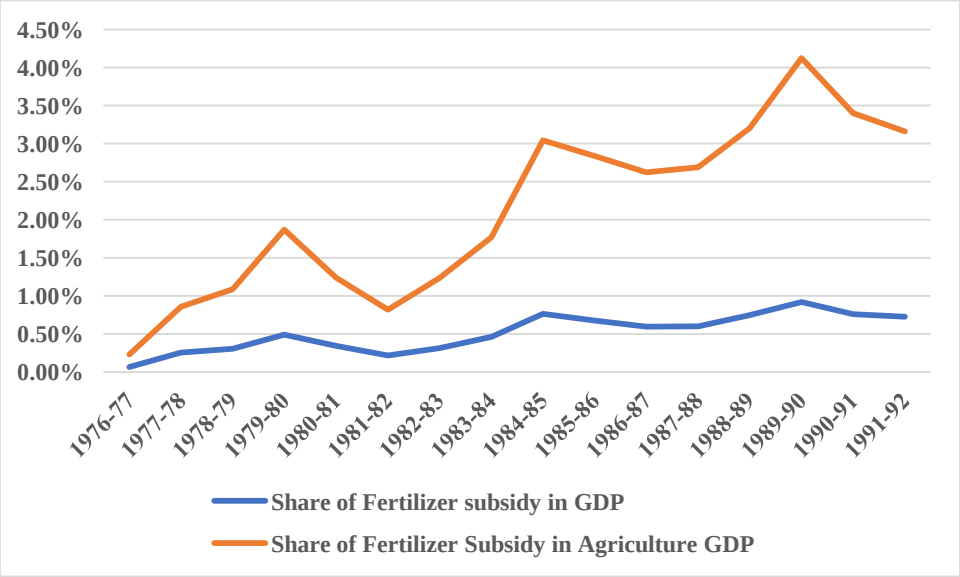
Table 1.1: Fertilizer Subsidy and Share of fertilizer subsidy in total subsidy

	Total Subsidies	**Fertilizer Subsidy**	**Share of fertilizer subsidy in total subsidy**
Year	**Rs Crore**	**Rs Crore**	**In per cent**
1979 – 1980	1543	526	34.09%
1980 – 1981	2028	505	24.90%
1981 – 1982	1941	381	19.63%
1982 – 1983	2262	603	26.66%
1983 – 1984	2749	1042	37.90%
1984 – 1985	4038	1928	47.75%
1985 – 1986	4796	1924	40.12%
1986 – 1987	5451	1898	34.82%
1987 – 1988	5980	2164	36.19%
1988 – 1989	7732	3201	41.40%
1989 – 1990	10474	4542	43.36%
1990 – 1991	12158	4389	36.10%
1991 – 1992	12253	5185	42.32%

Source: Budget Documents, GoI, Various years

But, how serious was the mounting fertilizer subsidy? Figure 1.1gives that, as it shows the trends in Fertilizer subsidy as a per cent of GDP and Agriculture GDP from 1979-80 to 1991-92. The fertilizer subsidy share in GDP had touched almost 1 per cent in 1989-90. On the other hand, it was 4.13 per cent of total Agriculture GDP in the same year. The fertilizer sector had been severely criticized for deteriorating the country's fiscal balance, especially when the country was facing several serious issues that later led to economic reforms. In short, thegovernment was single-handedly taking all the burden of developing an indigenous fertilizer sector.

Figure 1.1: Share of Fertilizer Subsidy in GDP and Agriculture GDP



Source: Computed from Budget documents and National Account Statistics, GoI, Variousyears

8. The Era of Containing Fertilizer Subsidies

The policies implemented in the sector had cost the government heavily in mounting subsidies. However, both consumption and production of fertilizers in the country improved substantially over the years. After the reforms, the government essentially looked to curb the subsidies by making the industry efficient and competitive. Since the subsidy paid to the fertilizer sector is essentially the difference between the farmgate price and the ex-factory price, the two ways of reducing the burden of subsidies are; increasing the farmgate price (i.e.'. increasing the MRP) and decreasing the ex-factory price (lowering the cost of production). Implementing the first way will adversely affect the consumption of fertilizers and, hence, food security, by reducing agricultural productivity. The second way is more suitable as the Retention Price Scheme had created an inefficient sector over the years. So, a reduction inthe cost of production helps in containing the subsidies. The government had taken both these steps to contain the subsidies. Other than these two, efficient subsidy distribution was also encouraged.

The State implemented the fertilizer containing measures in two sectors: The non-Urea sector and the Urea sector. The strategies adopted are given below.

A. Subsidy Containing Strategies in the Non-Urea Sector

Based on the recommendation of the Joint Parliamentary Committee in 1992, the government partially decontrolled the industry. As a result, phosphatic fertilizer products like DAP,MOP and NP/NPK and nitrogenous products like AS, CAN and ACl were kept out of government regulation. Entrepreneurs were given the freedom to fix the prices of these products and import these products.

Followed by the implementationof this policy, the decontrolled fertilizers' prices went up. Because of this, farmers demanded the Urea product more, as Urea was available to them at a low price. The lack of demand for the decontrolled fertilizers caused the units to shut down or reduce their capacity utilization. Such a policy negatively affected the agriculture sector. Overuse of Urea deteriorated the favourable NPK ratio, Ie.,4:2:1 (GoI, 1998, Meenakshi 1994).

Opening up the sector resulted in high competition from the low-cost products from other countries. Indian phosphatic manufacturing units were not able to meet the external competition. The government introduced the product-wise concession scheme to reduce the farmgate price to protect the manufacturers of domestic decontrolled fertilizers and correct the NPK ratio imbalance. A portion of the cost of production has been given back to the manufacturers of these products. On the other hand, to reduce the cost of production and hence the subsidy, being a sector with dependence on imported raw materials for production, the government encouraged the units to set up Joint Ventures abroad to get the raw materials at a cheap cost. The list of the joint ventures abroad is given in Appendix 1**.** Besides this**,** the Department of Agriculture and Co-operation started indicating all India uniform maximum retail prices (MRP) for the decontrolled fertilizers. MRPs were revised in 2002, and this system continued till 2010 in the case of DAP and MOP products.

Low demand for non-urea products and the high dependence on imported raw materials resulted in low capacity utilization of the decontrolled products (only 65 per cent on average). The high reliance on imports led to a massive hike in subsidies to this sector. Since the industry depends on imports more, an increase in prices of the decontrolled fertilizer products led to more subsidy outgo as the government was setting the MRPof the decontrolled fertilizers till 2010. This unprecedented outgo of subsidies, mainly due to a hike in

international prices, forced the government to stop the product-based concession scheme and implement the Nutrient Based Subsidy from 2010 onwards. With the NBS, the subsidy was paid to the manufacturers based on the amount of nutrients in the decontrolled fertilizers. The government revises the subsidy on each nutrient every year. In this, the freedom to set the prices for the product was given to the manufacturers. So, the sector moved from a regulated one to a partially regulated one.

B. Subsidy Containing Strategies in the Urea sector

The Urea sector was in the worst situation by the 2000s. As we have seen in the previous sessions, it became a heterogeneous industry with a high cost of production. The manufacturing units were practising 'Gold Plating[6]' to get more subsidies from the government. FICC, the sole government agency to coordinate the RPS scheme, has failed in doing so and cost the government in high subsidy outgo. The Comptroller and Audit General Report on the Fertilizer industry in 2000 concluded that FICC, while determining each manufacturing unit's retention price, relied entirely on the cost data given by the manufacturing units without doing a cross-check. The manufacturing units inflated the cost data. That created a hike in the retention prices of the producers and hence in the subsidy. Non-existence of detailed verification of cost data, absence of independent scrutiny system to check the corporate tax of manufacturing units, prescribing higher rate of depreciation, non-recovery of subsidy paid on sub-standard fertilizer and delay in retention price finalization/ revision made the government pay an excess of Rs 2181.47 crores (8.67 per cent) of the total Subsidy of Rs. 25155 crores on the urea sector during 1992-98. As a significant recipient of a large chunk of the fertilizer sector, the Urea sector had to undergo substantial changes to reduce the subsidy burden.

With the aim of greater efficiency, uniformity and transparency in subsidy distribution to urea units, the government has taken different steps like increasing the capacity utilization, converting the units to efficient feedstocks, implementing energy norms, encouraging investment, containing the diversion of Urea, reforms for efficient distribution of subsidy etc.

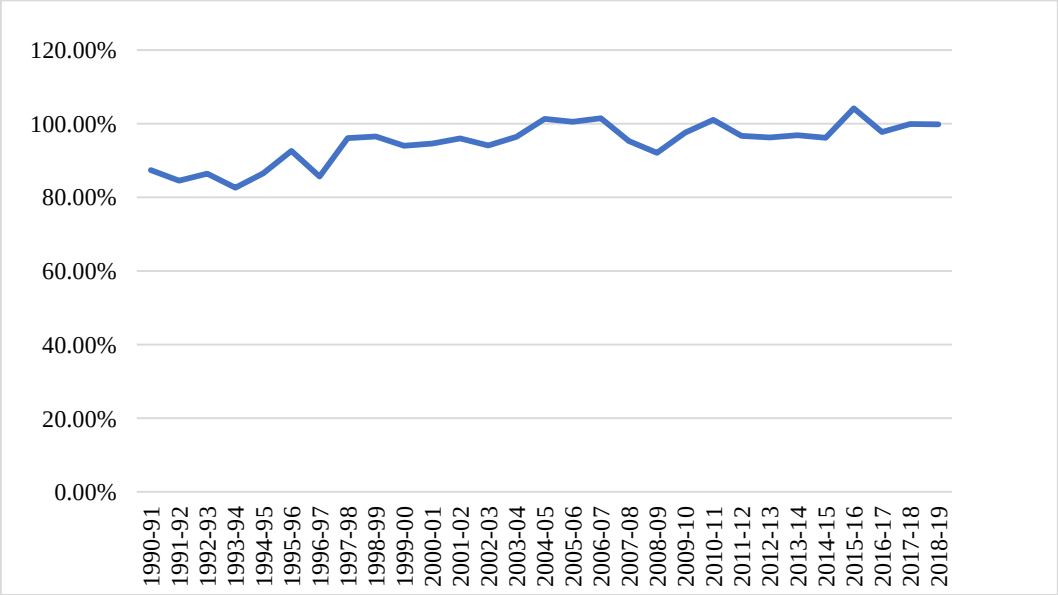
[6]Gold plating – some unit's reaped undue benefits from RPS by declaring a lower capacity. For lower capacity declaration, their retention prices got inflated artificially and the companies received more subsidy than they should have. This was known as gold plating.

Hence, the State tried to make them efficient by inducing them to adopt cost reduction measures as their own.

i. Increase the Capacity Utilization

Low-capacity utilization has been a feature of the Indian fertilizer industry. Age of the plant, choice of feedstock, high cost of feedstocks, shortage of raw materials, high cost of inputs for the production, failures of the production equipment, change in government policies over the years and change in demand for the fertilizers have led to lower production capacity utilization in Indian fertilizer industry (Venkateshwaralu et al., 2002). The low domestic capacity of production and capacity utilization are the primary reasons for the fertilizer imports to India (Sailaja, 1991; Sharma et al., 2010). There were instances of urea manufacturing units doing the 'gold plating' to receive more subsidies in the past (EPW, 2000). New Pricing Scheme introduced in 2002-03 onwards aimed to maximize indigenous urea production through increased capacity utilization. The 'Incentives for additional Urea Production' policy was implemented in 2004. The government incentivized all production between 100 per cent and 110 per cent of the reassessed capacity. The units, which are operating at more than 110 per cent capacity utilization, were compensated at their concession rate. The provision of prior permission from the government for the additional production of Urea has also been dispensed. This made the manufacturing units produce at a plant capacity of more than 100 per cent without any cap. The deregulation of 50 per cent of urea production from the purview of the Essential Commodities Act from 2003 onwards also increased the manufacturing units'output. This has resulted in higher capacity utilization of the units producing Urea. This can be seen from Figure 1.3 that there has been better capacity utilization than in the 1990s. It has increased from 80-85 per cent in 1990s to around 100 per cent after 2004-05.

Figure 1.2: Capacity Utilization of Urea



Source: Computed from Fertiliser Statistics, FAI, Various Years

ii. Converting to Efficient Feedstock and Implementing Energy Norms

As we have seen in previous sections, the high cost of production is always a problem for the industry. The choice of feedstock and the high price of various feedstocks constitute a large chunk of the total cost. Costlier inputs are the primary reason for the high cost of production (Roy, 2001). Among the feedstocks, natural gas is the cheapest and most efficient one. Over the years, with the greater availability of natural gas, there has been a shift from the feedstocks like coal, coke and ammonia to natural gas. Based on the recommendations of the Expenditure Reforms Commission of 2000, the New Pricing Scheme policy promoted natural gas usage and asked the non-gas-based urea manufacturers to convert to gas. This move facilitated the units to be competitive in the liberalized economic scenario. As of now, all 33 urea manufacturing units are using natural gas as their feedstock (FAI, 2020). This helped in bringing greater uniformity in the industry from a heterogeneous one during the time of RPS. Following this, to curb the increasing price of natural gas, the government introduced a gas pooling for the urea sector in 2015. This enabled the manufacturing plants to get gas at a uniform price and helped in reducing interplant variations in the cost of energy.

Uniformity in the feedstock in urea production and lack of enough natural gas in the country forced the government to implement the New Urea Policy in 2015. It facilitated all the gas-based urea manufacturing units to enhance energy efficiency and maximize indigenous

production. The government aimed at rationalizing the urea subsidy by inducing the manufacturing units to increase their production capacities. Based on the actual energy consumption of each gas-based unit, the then 25 units were classified into three groups. Group 1 consisted of 13 units with pre-set energy norms of 5.0 G cal/MT. Second and third groups consisted of 4 and 8 units, respectively, with 6-7 G cal/MT and more than 7 G cal/MT (See section 3.2 for the unit names). Implementing this policy helped to achieve an additional urea production of 20 lakh metric tonnes in 2015-16 over the previous period, making it 244.75 LMT, the highest production of Urea ever in India, as the units were incentivizedto maximize their production beyond the reassessed capacity of production. The production in subsequent years was also higher than in 2014-15. Later, the targets were revised in 2018 for 11 units, viz., IFFCO-Aonla I & II, IFFCO Phulpur I& II, IFFCO Kalol, RCFL-Thal, Yara Fert India- Babrala, Grasim Ind Jagdishpur, NFL-Vijaipur, CFCL- Gadepan I & II to attain 5.5 G cal/MT. For other units, the period to achieve was extended till 2020. Penalties were levied on them if they failed to achieve the targets.

iii. Encouraging Investment

The high cost of urea import resulted in a high subsidy outgo from the government. Low investment in the sector made the government to import more Urea. The urea sector has been facing an investment crunch over the years. The total production capacity of the urea sector after the RPS regime was 19791.3 thousand metric tonnes in 2002-03. At the end of 2018-19, it has increased to 26105.3 thousand metric tonnes. No new plant had operated in the sector from 1998 until 2019. Due to the lack of investment in the sector, the government had invited investment in the urea sector through the Investment Policy in 2008 and New Investment Policy in 2012. The NIP had amended in 2014. These policies couldn't invite any investment in expansion, Greenfield or Brownfield projects in the Urea sector except for revamping some ammonia and Urea plants. Only a few firms could revamp/ debottleneck the production capacity after 2000 (Table 1.2). Only two significant investments happened in Urea with the investment policies. The Matrix Fertilizers and Chemicals Ltd in Panagarh was started with Coal Bed Methane feedstock in 2017. But it couldn't continue production due to issues related to feedstock availability. Asignificant fresh investment happened in 2019 with a 1.34 LMTPA plant in Gadepan by Chambal Fertilizers and Chemicals Ltd. This was after 20 years when the last new investment occurred in the Urea sector in 1999.

Table 1.2: Investment in the Urea sector

Name of the Unit	Date of revamp/debottleneck
National Fertilizers Ltd, Nangal[1]	2001
BVFCL, Namrup III	2002
BVFCL, Namrup II	2005
IFFCO, Phulpur (2 units)	2005
IFFCO, Aonla (2 Units)	2005
Yara Fertilizers India, Babrala	2008
Chambal Fertilizers and Chemicals Ltd, Gadepan (2 units)	2009
Nagarjuna Fertilizers and Chemicals Ltd, Kakinada (2 Units)	2009
KRIBHCO, Hazira	2012
National Fertilizers Ltd, Vijaipur (2 Units)	2012
Rshtriya Chemicals and Fertilizers Ltd, Thal	2012
Kanpur Fert & Cement, Kanpur[2]	2013
Matrix Fertilizers & Chemicals Ltd, Panagarh[3]	2017
Chambal Fertilizers and Chemicals Ltd, Gadepan, Unit III[4]	2019

Source: Fertiliser Statistics, FAI, Various issues

1= Expansion 2= Revival of production 3= new investment with NIP 2012. But now remain idle due to feedstock limitations.4= New investment with NIP 2012.

The vagaries in natural gas availability, increasing prices, and low return on investment caused the investors to be away from the sector. The government had to invest in the industry due to the failure to attract investment and the need for more investment in the urea sector to make the country self-sufficient in urea production. Make in India programme and Aatmanirbhar Bharat helped in investing Rs. 40000 crores for reviving Fertilizer Corporation of India Ltd (FCIL) and Hindustan Fertilizer Corporation Ltd (HFCL) closed in the 1990s. 12.7 LMTPA plants will be revived each at Ramagundam (Telangana), Gorakhpur (Uttar Pradesh), Barauni (Bihar), Sindri (Jharkhand) and Talcher (Odisha) by forming Joint Ventures of Public Sector Undertakings.

This massive investment after the 1970s and 1980s will reduce the dependence on imports of Urea, achieve self-sufficiency in urea production and reduce the fiscal burden of fertilizer subsidy. Keeping this in view, the government has opened the urea sector for export in 2019

by revising the category from 'restricted' to 'free'. However, the manufacturers/ exporters needed to take prior permission from the government to export Urea.

iv. Containing the Diversion of Urea and Promoting Efficiency in Subsidy Payment

Diversion and black marketing of the subsidized Urea were prevalent in the sector. Manufacturing units have illegally sold the subsidized Urea in neighbouring countries like Nepal and Bangladesh at a higher price and madea considerable profit (GoI, 2015). This reduced the availability of domestic consumption. With the introduction of the Integrated Fertilizer Monitoring system[7] in 2007, the government could easily monitor the movement of fertilizer products. Mandatory production of all the subsidized Urea as neem coated urea contained the diversion of Urea to non-agriculture purposes. The state governments have been empowered to ensure the availability of fertilizers at MRP. They were also entitled to stop the smuggling and diversion of fertilizer products. They have the power to conduct search, seizure and take strict actions against the persons violating FCO, 1985 and ECA, 1955 provisions. The Department of Agriculture & Cooperation and Farmers Welfare and the Department of Fertilizers monitor the availability of fertilizers in the country.

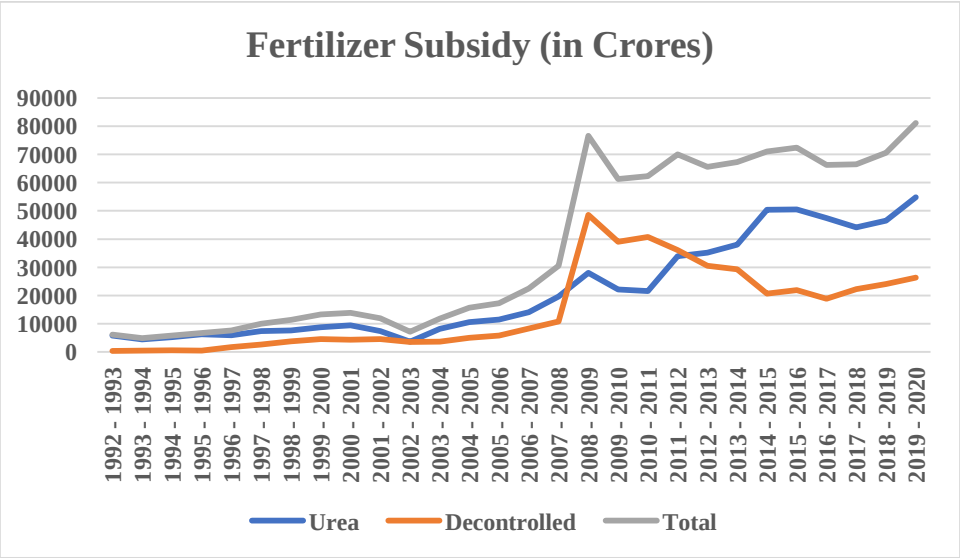
The Direct Benefit Transfer (DBT) System was implemented by the Department of Fertilizers in 2016 across all states to achieve an efficient distribution of subsidies without any leakages. As per this system, the total subsidy payments were released to the fertilizer companies on account of actual sales to the beneficiaries by the retailers through the point of purchase. The beneficiaries will be identified based on Aadhaar cards, Kisan credit cards etc. the earlier system of subsidy payment was based on the despatches from the factories. As we have seen earlier, there were chances of diversion of the subsidized products. DBT System enabled a better distribution of fertilizer products to the actual beneficiaries at a subsidized rate through the Integrated Fertilizer Monitoring system.

[7] Fertilizer Management System-The department of Fertilizers implemented the FMS in May 2007 with an aim to track movement of fertilizers in the country. It monitors the production, dispatches, receipts and sales of DAP, MOP, SSP, NPK and Urea (Indigenous and Imported) fertilizers from point of production to district warehouses. The system at present is being used for: tracking movement from plant/port till district level with relevant documentary evidence. It also monitors subsidy Bill Generation to subsidy payment to fertilizer companies.

8.1. Fertilizer Subsidy in Post Reform Era

Fertilizer subsidy has a positive correlation with the total consumption of Fertilizer products. Since the subsidy is given to the manufacturers based on consumption, the increase in consumption increased the subsidy over the years. As seen in the previous few sections,the post-reform era emphasized reducing the government's subsidy burden through three ways. The reforms adopted in the two sectors, the decontrolled sector and the urea sector had a considerable impact on the government's subsidy burden. Figure 1.5 depicts the trend of fertilizer subsidies from 1992 to 2020. Over the years, total fertilizer subsidy had increased from 6136 crores in 1992 to 79954 crores in 2019-20. We could see from the figure that there has been a massive hike in the subsidy followed by the Global Financial crisis in 2007-08. Being a major importer of fertilizer products globally, India has to import the products at a higher rate. An increase in cost of production also resulted in this massive hike in fertilizer subsidy. The decontrolled sector was affected more than the Urea sector during this period as they were more exposed to the international market.

Figure 1.3: Fertilizer Subsidy (1992-93 to 2019-20)



Source: Budget Documents, GoI

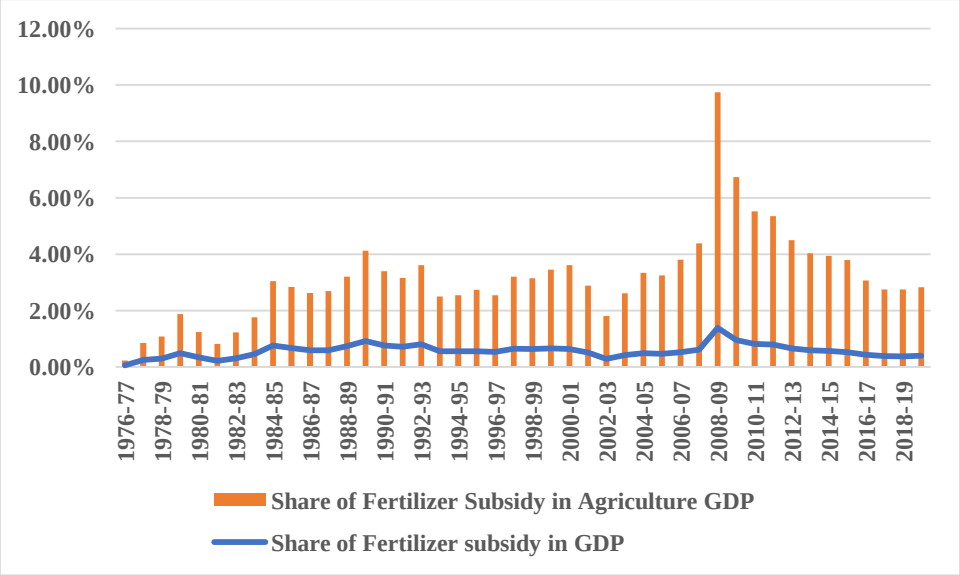
The urea sector was handling asignificant share in total subsidy most of the years during the period. The decontrolled fertilizers subsidy was higher than the Urea for four years from 2008-09 to 2011-12. The urea subsidy had increased from 5796 crores in 1992-93 to 54755.48 crores in 2019-20. The share of urea subsidy among the total subsidy was more

than 60 per cent till 2006-07. Though it reduced after that, it has increased again from 2014-15 onwards. The introduction of Nutrient Subsidy Scheme in 2010 in the decontrolled fertilizer sector due to the high subsidy outgo for 2008-09 and 2009-10 has reduced the subsidy in the years that followed. The subsidy to the decontrolled sector has reduced from 48554.79 crores in 2008-09 to 18843.42 crores in 2016-17. Better international conditions also helped in achieving this. We could see a near-stagnation in total fertilizer subsidies from 2010 onwards with a marginal increase in 2019-20. The decrease in decontrolled fertilizer subsidy offset the rise in urea subsidy. This resulted in an almost constant fertilizer subsidy.

9. The outcome of the Subsidy Containing Strategies

This session looks into the outcome of the subsidy containing strategies adopted in the fertilizer sector. Overall, the fertilizer subsidy has been on the rise due to the hike in the consumption of fertilizer products. The success of subsidy containing strategies is analyzed with the share of fertilizer subsidy in GDP and Agriculture GDP over the years. We also looked into the Coefficient of Variation of these shares in the pre and post-liberalization period.

Figure 1.4: Share of Fertilizer Subsidy in GDP and Agriculture GDP



Source: Computed using data from Budget Documents and National Account Statistics, GoI, Various years

We have seen the share of the fertilizer subsidy in GDP and Agriculture GDP in the Pre-liberalization era in session 7. During the Post-Liberalization period, the fertilizer subsidy, as a percentage of GDP, has reduced from 0.81 per cent in 1992-93 to 0.40 per cent in 2019-20, whereas it reached 1.39 per cent in 2008-09. The share of the same in agriculture GDP increased continuously from 3.61 per cent to 9.74 per cent in 2008-09. After that, it started declining to 2.83 per cent in 2019-20 (Figure 1.4).The global financial crisis led to a hike in fertilizer products and raw materials, causing the shares to increase during the period from 2007 to 2010.

Table: 1.3 Average shares of Fertilizer Subsidy in Pre and Post-Reform Period

	Fertilizer Subsidy as a per cent of GDP (Average)			***Fertilizer Subsidy as a per cent of Agri. GDP (Average)***		
Period	*Urea*	*Decontrolled*	*Total*	*Urea*	*Decontrolled*	*Total*
Pre-Liberalization (1976-77 to 1991-92)	-	-	0.51% *(0.47)*	-	-	2.14% *(0.53)*
Post-Liberalisation (1992-93 to 2009-10)	0.42% *(0.31)*	0.21% *(0.98)*	0.63% *(0.37)*	2.33% *(0.25)*	1.33% *(1.13)*	3.66% *(0.50)*
Post-Liberalisation (2010-11 to 2019-20)	0.32 % (0.17)	0.24% (0.60)	0.56 % (0.29)	2.24 % (0.16)	1.62 % (0.58)	3.85 % (0.26)
Post-Liberalisation (1992-93 to 2019-20)	0.38% *(0.3)*	0.22% *(0.84)*	0.60% *(0.35)*	2.29% *(0.22)*	1.44% *(0.92)*	3.73% *(0.42)*

Source: Computed by the Author
Note: Figures in the parenthesis are Coefficient of Variation

To analyze the extent of the success of the subsidy containing measures, we used the Coefficient of Variation of average shares of fertilizer subsidy in GDP and Agriculture GDP in both periods. The post-liberalization era was again divided into two; 1992-93 to 2009-10 and 2010-11 to 2019-20. Table 1.3 gives the average shares in each period and the coefficient of variation. We could see that the average share of fertilizer subsidy in GDP and Agriculture GDP has increased in the post-reform period. But the increase was mainly because of the financial crisis that led to issues in the international market. On the other hand, consumption increased, especially after the early 2000s. Comparing the two periods in the post-liberalization era reveals that the country could reduce the share of fertilizer subsidy in GDP as the average share had come down to 0.56 per cent from 0.63 per cent. The share of Urea in both GDP and Agriculture GDP had reduced in the later period to 0.32 per cent and 2.24 per cent than that of 0.42 per cent and 2.33 per cent respectively in 1992-93 to 2009-10 periods.

As seen in the previous session, the hike in total fertilizer subsidy in the latter half of the first decade of the 2000s was due to the unforeseen hike in the decontrolled fertilizers subsidy. Though there had a marginal increase in the share of decontrolled fertilizer subsidy in the second decade of the 2000s, the declining coefficient of variation in the post-liberalization era shows less variations in the shares of fertilizer subsidy. The CVs of Urea and Decontrolled subsidy in both GDP and Agriculture GDP during 2010-11 to 2019-20 show a declining trend compared to 1992-2010. This indicates that the government could contain the fertilizer subsidy, especially after 2010.

10. Conclusion

The State has played an essential role in developing an indigenous fertilizer industry over the years. It regulated all aspects of the industry, from production to distribution to consumption. By providing a conducive policy environment in the early days, the government essentially tried to build a base for the industry by encouraging the consumption and distribution of fertilizer products. At the same time, the government could also attract massive investment in the industry. Such a favourable policy environment had helped in the high production of various products to meet the increased demand. By ensuring every manufacturer a market for their products and a fair return on their investment, the industry reached new heights, especially in the 1970s and 1980s. But, all these policies have caused a high fertilizer subsidy outgo from the government.

There was a significant policy shift in the fertilizer sector during the reforms of 1991. After that, the government mainly focused on containing the mounting subsidies by partially decontrolling the industry and making them more efficient and competitive. Analyzing the fertilizer subsidy after the liberalization shows that the State could contain the fertilizer subsidy marginally as the total fertilizer subsidy was more or less the same from 2010 onwards. The declining CVs of the shares of fertilizer subsidy in GDP and Agriculture GDP reveal that the policies introduced in the 2010s had a significant impact on containing the fertilizer subsidies.

Fertilizer subsidies have been a debatable topic in the past and will be in the future too, given almost 60 per cent of the population are still dependent on agriculture with a living below the subsistence level. The withdrawal of fertilizer subsidies will negatively affect agricultural production and food security in the country, as both the consumers and the producers will be priced out of the market. But, the government will attempt to rationalize it as it creates a massive burden on the fiscal side.

Since this paper looked into whether the government could successfully contain the fertilizer subsidy or not, the implications of the subsidy policies on fertilizer manufacturing and self-sufficiency will be examined in another paper, as the policies adopted in the fertilizer sector delineate a conflicting nature.

Mr. Ajil Mankunnummal *is a Doctoral Scholar at the Centre for Development Studies, Thiruvananthapuram. His broad area of interest is state policies and innovation in the Indian fertilizer sector. Currently, he is working on the topic titled "Government Regulation and Technological Change in India's Fertilizer Manufacturing Industry". He is the corresponding author of this paper and could be reached at: ajil18phd@cds.ac.in.*

Appendix

Appendix 1: Joint Ventures abroad, decontrolled sector

Joint Ventures Abroad							
Company	Location	Participants	Est Cost (Us$Million)	Date of Commissioning	Product	Capacity ('000Tonnes)	Buy Back Arrangement By India
Foskor (Pty) Ltd	South Africa				Phosphoric Acid	750	
ICS Senegal	Darou, Senegal	IFFCO, India; Govt of India; Ics-Senegal	275.21; Debottlenecking 45.66	April 1984; Debottlenecking 1991	Phosphoric Acid	660	100 % Upto 550 Thousand Tonnes of Phosphoric Acid By Iifco
ICS Senegal (Expn)	Darou, Senegal	IFFCO India, ICS-Senegal	250	February 2002; Restructured In 2008 And 2014	Phosphoric Acid		
Indo Maroc Phosphore S.A (Imacid)	Jorf Lasfer, Morocco	CFL, India TCL, India Ocp-Morocco	230	October 1999; Revamb -2006	Phosphoric Acid	430	100%
Tunisian Indian Fertilizers (TIFERT) Sa	Skhira, Tunisia	GSFC, India; CIL, India; GCT, Tunisia	487	Jun-13	Phosphoric Acid	360	100% By Gsfc & Cil
Jordan India Fertilizers Co (JIFCO)	Eshidiya, Jordan	IFFCO, India; JPMC, Jordan	851	May-14	Phosphoric Acid	475.5	70-100%

Source: Fertilizer Statistics, FAI, 2020

References

Ashra, S., & Chakravarty, M. (2007).'Input Subsidies to Agriculture: Case of Subsidies to Fertiliser Industry across Countries'. *Vision*, 11(3), 35–58.

B. M. (1980). 'Mess in Fertilizers'. *Economic and Political Weekly*, 15(19), 839-840.

Baijal S S (1980), Development of fertilizers in India- FAI Silver Jubilee (1955-1980), FAI, New Delhi.

Bansal, P., &Rawal, V. (2020).'Economic Liberalisation and Fertiliser Policies in India'. *Social Scientist*, *48*(9/10 (568-569), 33-54.

Bumb, B. (1995), 'Global Fertiliser Perspective, 1980-2000: The Challenges in Structural Transformation', Technical Bulletin T-42. Muscle Shoals, AL: International Fertiliser Development Center.

'Demand Projections Go Awry'. (1986). *Economic and Political Weekly*, 21(35), 1523-1523.

Desai Gunwant M,(1986), Fertiliser Producing Prices in Developing Countries, The World Bank, Washington.

Desai, Gunwant M. (1982). American Journal of Agricultural Economics, 64(1), 166-166.doi:10.2307/1241194

FAI Annual Report (2016), Fertiliser Association of India, FAI, New Delhi.

FAI Annual Report (2017), Fertiliser Association of India, FAI, New Delhi.

FAI Annual Report (2018), Fertiliser Association of India, FAI, New Delhi.

FAO (1998), Guide to Efficient Plant Nutrition Management, FAO/AGL Publication, FAO, Rome.

Fertiliser Association of India (various years): Fertiliser Statistics, FAI, New Delhi, India

'Fertiliser Industry: An Overview'. (1984). *Economic and Political Weekly*, 19(50), AS2-AS7.

'Front Matter'. (1986). *Economic and Political Weekly*, 21(51), 2199-2199.

Government of India (2016): Economic Survey, Ministry of Finance, New Delhi, India.

Gulati Ashok, Ferroni Macro and Zhou Yuan (2018), Supporting Indian Farms the Smart Way, Academic Foundation in association with ICRIER

Gulati, Ashok (1989): 'Input Subsidies in Indian Agriculture – A State wise Analysis', *Economic and Political Weekly*, Vol. 24, No. 25.

Gulati, Ashok (1990), "Fertilizer Subsidy: Is the Cultivator 'Net Subsidized'? *Indian Journal of Agricultural Economics*, Vol. 45, No. 1, Jan.-Mar. 1990, pp. 1-11.

Gulati, Ashok., & G. D. Kalra. (1992). 'Fertilizer Subsidy: Issues Related to Equity and Efficiency'. *Economic and Political Weekly*, 27(13), A43-A48.

Gulati, Ashok., & Sudha Narayanan. (2000). 'Demystifying Fertilizer and Power Subsidies in India'. *Economic and Political Weekly*, 35(10), 784-794.

H. N Sethna. (1972). 'The Fertilizer Corporation of India Ltd.'*Economic and Political Weekly*, *7*(53), 2541-2544.

Kohli Harinder S,(1986), Fertiliser Producing Prices in Developing Countries, The World Bank, Washington.

Kumar, S. (1999), 'Urea Import by China and Its Implications for India'. *Economic and Political Weekly*, 34(27), 1823-1827.

Kumar, S. (1999). 'New Fertiliser Policy: A Practical Approach'. *Economic and Political Weekly*, 34(1/2), 57-63.

Leela, Pillalamarri. (1984), Import Substitution and Economic Efficiency: A Micro Level Study, Bombay, Himalaya Publishing House.

Meenakshi, J. (1992). 'Partial Decontrol of Fertilizer Price's. *Economic and Political Weekly*, 27(43/44), 2347-2348.

'Mismanaged Supply'. (1986). *Economic and Political Weekly*, 21(3), 101-101.

Mittal, D.K., 1994: Fertiliser Industry, New Delhi, India, Anmol Publications Ltd

Mukherjee S K (1980), Development of fertilizers in India- FAI Silver Jubilee (1955-1980), FAI, New Delhi

Mukherjee, S. (1984). 'Direction of Development of India's Fertiliser Industry'. *Economic and Political Weekly*, 19(50), AS13-AS14.

Narayan Pratap,(1986), Fertiliser Producing Prices in Developing Countries, The World Bank, Washington

'Not by Naphtha Alone'. (1970). *Economic and Political Weekly*, 5(23), 894-894.

Paul Pothen (1980), Development of fertilizers in India- FAI Silver Jubilee (1955-1980), FAI, New Delhi

'Planning Gone Awry'. (1987). *Economic and Political Weekly*, 22(28), 1102-1102.

Ramanathan K V (1980), Development of fertilizers in India- FAI Silver Jubilee (1955-1980), FAI, New Delhi

Ramanathan S,(1986), Fertiliser Producing Prices in Developing Countries, The World Bank, Washington

Roy, A. (2001). 'Why Not Coal-Based Fertilizer Plants?'*Economic and Political Weekly*, 36(21), 1790-1792.

Roy, A. (2003). ‘Closure of Sindri Fertilizers: A Political Decision’. *Economic and Political Weekly*, 38(10), 933-935.

S. Venkateshwarlu, & Sen, A. (2002). ‘Fertiliser Industry in India: Moulded by Government Policies’. *Economic and Political Weekly*, 37(4), 326-336.

Sailaja K. (1991), Fertiliser Imports of India, Allahabad, Chug

Sappington David, (1986), Fertiliser Producing Prices in Developing Countries, The World Bank, Washington

Segura Edilberto L, Shetty Y T and Nishimizu mieko. (1986), Fertiliser Producing Prices in Developing Countries, The World Bank, Washington

Sharma, Vijay Paul and Hrima Thakker (2009), ‘Fertilizer Subsidy in India: Who are the Beneficiaries?’, W.P. No. 2009-07-01, Indian Institute for Management, Ahmedabad.

Sharma, Vijay Paul and Hrima Thakker (2010), "Economic Policy Reforms and Indian Fertiliser Industry", Allied Publishers, New Delhi.

‘Shifting Focus in Fertilisers’. (1970). *Economic and Political Weekly*, 5(46), 1831-1832.

Sivaraman, B. (1980), Development of fertilizers in India- FAI Silver Jubilee (1955-1980), FAI, New Delhi

Tomich, T., P. Kilby, and B. Johnson. (1995) Transforming Agrarian Economies: Opportunities Seized, Opportunities Missed. Ithaca, NY: Cornell University Press.

Vidya Sagar. (1991). ‘Fertilizer Pricing: Are Subsidies Essential?’*Economic and Political Weekly*, 26(50), 2861-2864.

PUBLICATIONS

For information on all publications, please visit the CDS Website: www.cds.edu. The Working Paper Series was initiated in 1971 and can be downloaded from the website.

The Working Papers published after January 2020 are listed below:

W.P. 505 **SUNIL MANI, CHIDAMBARAN G IYER,** *Diffusion of Digital Payments in India, 2011-12 through 2020-21: Role of Its Sectoral System of Innovation,* February 2022

W.P. 504 **S. IRUDAYA RAJAN, BALASUBRAMANYAM PATTATH,** *Kerala Return Emigrant Survey 2021: What Next for Return Migrants of Kerala?*. September 2021

W.P. 503 **SRIKANTA KUNDU, AMARTYA PAUL,** *Effect of Economic Policy Uncertainty on Stock Market Return and Volatility under Heterogeneous Market Characteristics.* August 2021

W.P. 502 **CHIDAMBARAN G. IYER**, *Mobile Phone Manufacturing in India: A Study of few Characteristics.* February 2021

W.P. 501 **SUSAMA HANSDAH, ABHILASH T,** *Scheduled Tribes and School Education: Analysis of a Household Survey in Mayurbhanj District of Odisha.* December 2020.

W.P. 500 **TIRTHA CHATTERJEE, THIAGU RANGANATHAN**, *Did Reservation in Higher Education Change The Prospects For OBCs in Getting Better Jobs? A Study Using Periodic Labour Force Survey (PLFS) in India.* October 2020.

W.P. 499 **ARITRI CHAKRAVARTY**, *Information Seeking by Agricultural Households in India: Determinants of Access and Choice of Sources*. September 2020.

W.P. 498 **RIMON SAHA,** *Patterns and Determinants of State Expenditure on Human Priority Sectors in India*. September 2020.

W.P. 497 **UPASAK DAS, AMARTYA PAUL, MOHIT SHARMA,** *Using Information and Technology to Improve Efficacy of Welfare Programs: Evidence from a Field Experiment in India.* August 2020.

W.P. 496 **SUNIL MANI**, *India's Quest for Technological Self Reliance Analysis of her Record with Respect to Patents in the Post Trips Phase*. August 2020.

W.P. 495 **SUDIP CHAUDHURI**, *Evolution of the Pharmaceutical Industry in Bangladesh, 1982 to 2020.* July 2020.

W.P. 494 **THIAGU RANGANATHAN, AVINA MENDONCA,** *Relative Educational Status and Women's Autonomy: Evidence from India.* May 2020.

W.P. 493 **ANURAG ANAND,** *Economic Policy Reforms, Foreign Direct Investment and the Patterns of MNC Presence in India: Overall and Sectoral Shares*. January 2020.

W.P. 492 **S. IRUDAYA RAJAN, UDAYA S. MISHRA,** *Resource Allocation in lieu of State's Demographic Achievements in India: An Evidence Based Approach.* January 2020.

W.P. 491 **HRUSHIKESH MALLICK**, *Role of Governance and ICT Infrastructure in Tax Revenue Mobilization in India.* January 2020.

Centre for Development Studies
Prasanth Nagar Road, Ulloor,
Medical College.P.O,
Thiruvananthapuram - 695011
Kerala, India

Phone: +91 471 2448881, 2442481, 2448412
Fax: +91 471 2447137
Website: www.cds.edu